1 WHAT IS CLAIMED IS:

- 1. A catalyst composition comprising:
- 3 a carrier;
- 4 a catalytically effective amount of silver; and,
- 5 a rubidium promoter comprising a quantity of from
- 6 5 μmole to up to 60 μmole per gram of catalyst
- 7 composition.
- 1 2. The catalyst composition of claim 1, wherein the
- 2 carrier comprises an α -alumina having a BET surface area
- 3 of from $0.01 \text{ m}^2/\text{g}$ to $50 \text{ m}^2/\text{g}$, and an apparent porosity of
- 4 from 0.1 ml/g to 2 ml/g, measured by water absorption.
- 1 3. The catalyst composition of claim 1, wherein the
- 2 carrier comprises a silver bonded calcium carbonate
- 3 having a crush strength of at least 22 N
- 1 4. The catalyst composition of claim 1, wherein the
- 2 carrier comprises a silver bonded calcium carbonate
- 3 wherein the weight ratio of silver to calcium carbonate
- 4 is from 1:5 to 1:100.
- 1 5. The catalyst composition of claim 1, wherein the
- 2 carrier comprises a silver bonded calcium carbonate
- 3 having a specific surface area of from $1 \text{ m}^2/\text{g}$ to $20 \text{ m}^2/\text{g}$.
- 1 6. The catalyst composition of claim 1, wherein the
- 2 carrier comprises a silver bonded calcium carbonate
- 3 having a specific surface area of from 1 m^2/g to 3 m^2/g .

- 1 7. The catalyst composition of claim 1, wherein the
- 2 carrier comprises a silver bonded calcium carbonate
- 3 having an apparent porosity of from 0.05 ml/g to 2 ml/g.
- 1 8. The catalyst composition of claim 1, wherein the
- 2 carrier comprises a silver bonded calcium carbonate
- 3 having an apparent porosity of from 0.1 ml/g to 1.5 ml/g.
- 1 9. The catalyst composition of claim 1, wherein the
- 2 carrier comprises at least 95 %w α-alumina.
- 1 10. The catalyst composition of claim 9, wherein the
- 2 α -alumina carrier has a pore size distribution within a
- 3 total pore volume such that pores with diameters in the
- 4 range of from 0.2 μm to 10 μm represent more than 75 % of
- 5 the total pore volume; pores with diameters greater than
- 6 10 μm represent less than 20 % of the total pore volume;
- 7 and pores with diameters less than 0.2 µm represent less
- 8 than 10 % of the total pore volume.
- 1 11. The catalyst composition of claim 9, wherein the
- 2 α -alumina carrier has a pore size distribution such that
- 3 pores with diameters in the range of from 0.2 µm to 10
- 4 μm represent more than 90 % of the total pore volume;
- 5 pores with diameters greater than 10 μm represent less
- 6 than 10 % of the total pore volume; and pores with
- 7 diameters less than 0.2 µm represent less than 7 % of the
- 8 total pore volume.

- 1 12. The catalyst composition of claim 9, wherein the
- 2 α -alumina carrier has a surface area of at most 2.9 m²/g.
- 1 13. The catalyst composition of claim 9, wherein the
- 2 α -alumina carrier has a water absorption of at least 0.35
- 3 ml/g and a surface area in the range of from $1.4 \text{ m}^2/\text{g}$ to
- 4 2.6 m^2/q .
- 1 14. The catalyst composition of claim 9, wherein the
- 2 α -alumina carrier is made by a method which comprises:
- 3 forming a mixture comprising:
- 4 (a) from 50 %w to 90 %w of a first particulate α -
- 5 alumina having an average particle size of from more than
- 6 10 μ m up to 100 μ m; and
- 7 (b) from 10 %w to 50 %w of a second particulate α -
- 8 alumina having an average particle size of from 1 µm to
- 9 10 μm ; the %w being based on the total weight of $\alpha\text{--}$
- 10 alumina in the mixture; and,
- firing the mixture to form the carrier.
- 1 15. The catalyst composition of claim 14, wherein
- 2 the α -alumina carrier comprises:
- 3 (a) from 65 %w to 75 %w, relative to the total
- 4 weight of α -alumina in the mixture, of a first
- 5 particulate α -alumina having an average particle size of
- 6 from 11 μm to 60 μm;
- 7 (b) from 25 %w to 35 %w, relative to the total
- 8 weight of α -alumina in the mixture, of a second

- 9 particulate α -alumina having an average particle size of
- 10 from 2 μm to 6 μm;
- 11 (c) from 2 %w to 5 %w of an alumina hydrate,
- 12 calculated as aluminum oxide relative to the total weight
- 13 of α -alumina in the mixture;
- (d) from 0.2 %w to 0.8 %w of an amorphous silica
- 15 compound, calculated as silicium oxide relative to the
- 16 total weight of α -alumina in the mixture; and,
- 17 (e) from 0.05 %w to 0.3 %w of an alkali metal
- 18 compound, calculated as the alkali metal oxide relative
- 19 to the total weight of α -alumina in the mixture.
- 1 16. A process for the oxidation of an olefin, which
- 2 process comprises reacting the olefin with oxygen in the
- 3 presence of a catalyst composition comprising a carrier;
- 4 a catalytically effective amount of silver; and, a
- 5 rubidium promoter, wherein the rubidium metal promoter
- 6 comprises a quantity of from 5 μ mole to up to 60 μ mole
- 7 per gram of catalyst composition.
- 1 17. The process of claim 16, wherein the carrier
- 2 comprises a silver bonded calcium carbonate having a
- 3 crush strength of at least 22 N.
- 1 18. The process of claim 16, wherein the carrier
- 2 comprises a silver bonded calcium carbonate wherein the
- 3 weight ratio of silver to calcium carbonate is 1:9.

- 1 19. The process of claim 16, wherein the carrier
- 2 comprises a silver bonded calcium carbonate having a
- 3 specific surface area of from $1 \text{ m}^2/\text{g}$ to $20 \text{ m}^2/\text{g}$.
- 1 20. The process of claim 16, wherein the carrier
- 2 comprises a silver bonded calcium carbonate having a
- 3 specific surface area of from $1 \text{ m}^2/\text{g}$ to $3 \text{ m}^2/\text{g}$.
- 1 21. The process of claim 16, wherein the carrier
- 2 comprises a silver bonded calcium carbonate having an
- 3 apparent porosity of from 0.05 ml/g to 2 ml/g.
- 1 22. The process of claim 16, wherein the carrier
- 2 comprises a silver bonded calcium carbonate having an
- 3 apparent porosity of from 0.1 ml/g to 1.5 ml/g.
- 1 23. The process of claim 16, wherein the carrier
- 2 comprises an α -alumina carrier which has been obtained by
- 3 a method which comprises:
- 4 forming a mixture comprising:
- 5 (a) from 50 %w to 90 %w of a first particulate α -
- 6 alumina having an average particle size of from more than
- 7 10 μ m up to 100 μ m; and,
- 8 (b) from 10 %w to 50 %w of a second particulate α -
- 9 alumina having an average particle size of from 1 µm to10
- 10 μm ; and wherein the %w is based on the total weight of α -
- 11 alumina in the mixture;
- forming the mixture into shaped bodies; and,
- firing the shaped bodies to form the carrier.

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- 2 24. The process of claim 16, wherein the carrier
- 3 comprises an α -alumina carrier having a pore size
- 4 distribution in a total pore volume such that pores with
- 5 diameters in the range of from 0.2 μm to 10 μm represent
- 6 more than 75% of the total pore volume; pores with
- 7 diameters greater than 10 µm represent less than 20 % of
- 8 the total pore volume; and pores with diameters less than
- 9 0.2 µm represent less than 10 % of the total pore volume.
- 1 25. The process of claim 16, wherein the carrier
- 2 comprises an α -alumina carrier having a pore size
- 3 distribution in a total pore volume such that pores with
- 4 diameters in the range of from 0.2 µm to 10 µm comprise
- 5 more than 90 % of the total pore volume; pores with
- 6 diameters greater than 10 µm represent less than 10 % of
- 7 the total pore volume; and pores with diameters less than
- 8 0.2 μm represent less than 7 % of the total pore volume.
- l 26. The process of claim 16, wherein the carrier
- 2 comprises an α-alumina carrier having a surface area of
- 3 at most $2.9 \text{ m}^2/\text{g}$.
- l 27. The process of claim 16, wherein the carrier
- 2 comprises an α -alumina carrier having a water absorption
- 3 of at least 0.35 ml/g and a surface area in the range of
- 4 from 1.4 m^2/g to 2.6 m^2/g .
- 1 28. The process of claim 16, wherein the carrier
- 2 comprises an α -alumina carrier made by a method which
- 3 comprises:

- 4 forming a mixture comprising:
- 5 (a) from 50 %w to 90 %w of a first particulate α -
- 6 alumina having an average particle size of from more than
- 7 10 μm up to 100 μm; and
- 8 (b) from 10 %w to 50 %w of a second particulate α -
- 9 alumina having an average particle size of from 1 µm to
- $10~10~\mu\text{m}$; the %w being based on the total weight of α -
- 11 alumina in the mixture; and,
- 12 firing the mixture to form the carrier.
- 1 29. The process of claim 16, wherein the carrier
- 2 comprises an α -alumina carrier having a composition
- 3 comprising:
- 4 (a) from 65 %w to 75 %w, relative to the total
- 5 weight of α -alumina in the mixture, of a first
- 6 particulate α -alumina having an average particle size of
- 7 from 11 μ m to 60 μ m;
- 8 (b) from 25 %w to 35 %w, relative to the total
- 9 weight of α -alumina in the mixture, of a second
- 10 particulate α -alumina having an average particle size of
- 11 from 2 %w to 6 %w;
- 12 (c) from 2 %w to 5 %w of an alumina hydrate,
- 13 calculated as aluminum oxide relative to the total weight
- 14 of α -alumina in the mixture;
- 15 (d) from 0.2 %w to 0.8 %w of an amorphous silica
- 16 compound, calculated as silicium oxide relative to the
- 17 total weight of α -alumina in the mixture; and,

- 18 (e) from 0.05 %w to 0.3 %w of an alkali metal
- 19 compound, calculated as the alkali metal oxide relative
- 20 to the total weight of α -alumina in the mixture.
 - 1 30. The process of claim 16, which process further
- 2 comprises adding an organic chloride promoter.
- 1 31. The process of claim 30, wherein the organic
- 2 chloride promoter is present at a concentration of at
- 3 least 50 ppm by volume.
- 1 32. The process of claim 16, which process further
- 2 comprises adding a NO_x promoter, wherein x is 1 or 2.
- 1 33. The process of claim 32, wherein the NO_x promoter
- 2 is present at a concentration of 500 ppm by volume.
- 1 34. A composition comprising propylene oxide, made
- 2 by a process comprising reacting propylene with oxygen in
- 3 the presence of a catalyst composition comprising silver
- 4 and a rubidium promoter deposited on a carrier, wherein
- 5 the rubidium metal promoter comprises a quantity of from
- 6 30 μmole to 50 μmole per gram of catalyst composition
- 1 35. A composition comprising a derivative of
- 2 propylene oxide, wherein the propylene oxide is made by a
- 3 process comprising reacting propylene with oxygen in the
- 4 presence of a catalyst composition comprising a carrier;
- 5 a catalytically effective amount of silver; and, a
- 6 rubidium promoter deposited on a carrier, wherein the

- 7 rubidium metal promoter comprises a quantity of from 5
- 8 μmole to up to 60 μmole per gram of catalyst composition.